

Self-Esteem Development Across the Lifespan:
A Longitudinal Study with a Large Sample from Germany

Ulrich Orth

University of Bern

Jürgen Maes

Bundeswehr University Munich

Manfred Schmitt

University of Koblenz–Landau

This article has been accepted for publication but has not been through the copyediting, typesetting, pagination, and proofreading process. This article may not exactly replicate the final version published in the journal. It is not the copy of record. Please cite this article as follows:

Orth, U., Maes, J., & Schmitt, M. (2015). Self-esteem development across the life span: A longitudinal study with a large sample from Germany. *Developmental Psychology*, 51, 248-259. <http://dx.doi.org/10.1037/a0038481>

Author Note

Ulrich Orth, Department of Psychology, University of Bern, Bern, Switzerland; Jürgen Maes, Department of Psychology, Bundeswehr University Munich, Neubiberg, Germany; Manfred Schmitt, Department of Psychology, University of Koblenz–Landau, Landau, Germany.

Correspondence concerning this article should be addressed to Ulrich Orth, Department of Psychology, University of Bern, Fabrikstrasse 8, 3012 Bern, Switzerland. E-mail: ulrich.orth@psy.unibe.ch

Abstract

We examined the development of self-esteem across the lifespan. Data came from a German longitudinal study with three assessments across 4 years of a sample of 2,509 individuals aged 14 to 89 years. The self-esteem measure used showed strong measurement invariance across assessments and birth cohorts. Latent growth curve analyses indicated that self-esteem follows a quadratic trajectory across the lifespan, increasing during adolescence, young adulthood, and middle adulthood, reaching a peak at age 60 years, and then declining in old age. No cohort effects on average levels of self-esteem or on the shape of the trajectory were found. Moreover, the trajectory did not differ across gender, level of education, or for individuals who had lived continuously in West vs. East Germany (i.e., the two separate countries from 1949 to 1990). However, the results suggested that employment status, household income, and satisfaction in the domains of work, relationships, and health contribute to a more positive lifespan trajectory of self-esteem. The findings have significant implications because they call attention to developmental stages in which individuals may be vulnerable due to low self-esteem (such as adolescence and old age) and to factors that predict successful versus problematic developmental trajectories.

Keywords: self-esteem, lifespan development, measurement invariance, longitudinal

Self-Esteem Development Across the Lifespan:

A Longitudinal Study with a Large Sample from Germany

How the self-esteem of individuals develops as they go through life is of considerable societal significance because mounting evidence suggests that self-esteem is predictive of a person's success and well-being in important life domains such as relationships, work, and health. For example, longitudinal research indicates that self-esteem predicts satisfaction in marriage and close relationships (Orth, Robins, & Widaman, 2012), social support (Marshall, Parker, Ciarrochi, & Heaven, 2014), success and well-being in working life (Kuster, Orth, & Meier, 2013; Orth et al., 2012), mental health (Sowislo & Orth, 2013; Trzesniewski et al., 2006), and physical health (Orth et al., 2012; Trzesniewski et al., 2006). In recent years, a growing number of studies have provided important insights into the nature and consequences of self-esteem development (for a review, see Orth & Robins, 2014). However, few longitudinal studies have examined self-esteem from a lifespan perspective, due to the lack of studies that included samples with sufficiently broad age ranges. As yet, two longitudinal data sets have been used to track the self-esteem trajectory across the lifespan (Orth et al., 2012; Orth, Trzesniewski, & Robins, 2010). However, although these studies yielded converging evidence on the lifespan trajectory, their samples came from a single country (specifically, the United States). Given that cultures shape the prototypical self-concept and tendency toward self-enhancement among their members (Heine, Lehman, Markus, & Kitayama, 1999; Markus & Kitayama, 1991), thus potentially affecting the normative self-esteem trajectory, it is important to examine the lifespan trajectory in samples from other cultural contexts.

In this paper, we use data from a large longitudinal study from Germany that includes individuals aged 14 to 89 years, (a) to study the shape of the lifespan trajectory of self-esteem,

(b) to test for generational changes in the trajectory, and (c) to examine moderating factors of self-esteem development. Moreover, given that the study was conducted in the 1990s, a few years after German reunification in 1990, and given that people in West versus East Germany had long been living in two separate states with important political, economic, and social differences (from 1949 to 1990), we used the unique design of the study to test whether the findings replicate across these two cultural contexts within Germany.

Before describing the current state of knowledge on the development of self-esteem, we briefly define the construct. Self-esteem refers to the “individual’s subjective evaluation of his or her worth as a person” (Donnellan, Trzesniewski, & Robins, 2011, p. 718; see also Harter, 2006). Importantly, self-esteem does not necessarily reflect the individual’s objective abilities or social status. Moreover, self-esteem is typically defined as the “feeling that one is ‘good enough,’” although high self-esteem does not necessarily imply that the person considers him- or herself superior to others (Rosenberg, 1965, p. 31). Thus, self-esteem involves feelings of self-acceptance and self-respect, but the construct is conceptually and empirically distinct from narcissism (Ackerman et al., 2011). Empirical evidence shows that individual differences in self-esteem are relatively stable across time (Trzesniewski, Donnellan, & Robins, 2003), even across several decades (Kuster & Orth, 2013), suggesting that the stability of self-esteem is similar to the stability of the Big Five personality factors (Roberts & DelVecchio, 2000). Hence, self-esteem should be considered a personality trait.

Theoretical Perspectives on Lifespan Development of Self-Esteem

Although research indicates that self-esteem changes systematically as people age, no theory is yet available that focuses specifically on the development of self-esteem across the lifespan. Within the broader context of personality development, a number of theories have been

suggested (for a review, see Specht et al., 2014), of which the neo-socioanalytic theory (Roberts & Wood, 2006; see also Roberts, Wood, & Caspi, 2008) is of particular relevance for deriving hypotheses about how and why self-esteem changes across the life course. Although the neo-socioanalytic theory accounts for genetic influences on personality, a central proposition is that environmental factors can influence personality traits at any age (a proposition called the plasticity principle). In particular, the theory emphasizes the importance of social roles for personality development, stating that social roles are the primary channel through which the environment influences personality. People assume social roles in life domains such as close relationships, family, work, and the community, and each social role involves a set of social expectations that describe which behavior is role-congruent and, consequently, which behavior will be rewarded or punished by others who interact with the individual. These expectations influence behavior and, in the long run, may lead to changes in the individual's personality. According to the neo-socioanalytic theory, many social roles (such as the roles of spouse, parent, employee, and supervisor) call for emotional stability, conscientiousness, social dominance, and agreeableness.

During young adulthood, people establish many new social roles, for example by entering into working life, by marrying (or cohabiting with a relationship partner), and by having a baby (Hutteman, Hennecke, Orth, Reitz, & Specht, 2014). During middle adulthood, the developmental tasks typically consist in further investing in these social roles, by maintaining a satisfying relationship with one's spouse or relationship partner, by helping children to become responsible and well-functioning adults, and by further improving one's professional competencies and, frequently, taking on more managerial functions at work (Hutteman et al., 2014). In both young and middle adulthood, most people invest heavily in their social roles,

and—according to the neo-socioanalytic theory—therefore develop in the direction of personality characteristics that help them to function better in these social roles (as described by the social investment principle and the maturity principle; Roberts & Wood, 2006; Roberts et al., 2008). Mature personality traits such as emotional stability, conscientiousness, social dominance, and agreeableness are associated with self-esteem (Robins, Hendin, & Trzesniewski, 2001; Watson, Sulz, & Haig, 2002). Moreover, self-esteem is itself a characteristic that improves functioning in social roles (Orth et al., 2012). Consequently, neo-socioanalytic theory suggests that self-esteem shows normative increase during young and middle adulthood.

With regard to old age, however, theoretical perspectives suggest that self-esteem might no longer show normative increase but rather decrease (Orth et al., 2010). First, the transition to old age frequently includes negative changes in social roles, in particular due to retirement from work, the empty nest situation (i.e., when a person's children have grown up and left home), and, possibly, widowhood. Consistent with the emphasis on social roles in neo-socioanalytic theory, empirical studies tend to show normative decrease in conscientiousness during old age (Lucas & Donnellan, 2011; Marsh, Nagengast, & Morin, 2013; Specht, Egloff, & Schmukle, 2011), which might entail a decrease in self-esteem. Second, transitions in old age not only affect social roles but may also lead to negative changes in social relationships. For example, retirement significantly reduces or even ends contact with former coworkers, and widowhood may—beside the loss of the relationship partner itself—negatively alter one's relationships with children and the spouse's family and friends. Given that relationships are one of the most influential factors of self-esteem (Leary & Baumeister, 2000; MacDonald & Leary, 2012), significant loss in the relationship domain might lead to reduced self-esteem in old age. Third, in old age people often experience negative changes with regard to other important sources of self-esteem, such as

socioeconomic status (as indicated by income and occupational prestige) and health (e.g., reduced mobility and declining cognitive and physical abilities; Baltes & Mayer, 1999; Wagner, Gerstorf, Hoppmann, & Luszcz, 2013), which might further impair self-esteem.

Previous Research on Lifespan Development of Self-Esteem

Empirical evidence is provided by two longitudinal studies that have examined the lifespan trajectory of self-esteem (Orth et al., 2012; Orth et al., 2010). In both studies, a curvilinear trajectory with an inverted U-shape provided the best fit to the data: self-esteem increased from adolescence to middle adulthood, peaked at about age 50 to 60 years, and then decreased into old age. Across studies, the increase corresponded to about one third to one half of a standard deviation, and the decrease to about two thirds of a standard deviation. Additional longitudinal studies have focused on specific developmental periods such as adolescence (Birkeland, Melkevik, Holsen, & Wold, 2012; Erol & Orth, 2011; Steiger, Allemand, Robins, & Fend, 2014), young adulthood (Chung et al., 2014; Wagner, Lang, Neyer, & Wagner, 2014; Wagner, Lüdtke, Jonkmann, & Trautwein, 2013; Zeiders, Umaña-Taylor, & Derlan, 2013) and old age (Wagner, Gerstorf, et al., 2013; Wagner et al., 2014). Overall, the results of these studies are consistent with the lifespan trajectory summarized above. Further evidence is provided by a meta-analysis of mean-level change in self-esteem, which suggests that self-esteem increases in young adulthood, but does not change after age 30 years; however, few studies were available after age 30, limiting the statistical power of analyses in middle and older adulthood (Huang, 2010).

In addition, cross-sectional studies have tested for age differences in self-esteem over the life course (McMullin & Cairney, 2004; Pullmann, Allik, & Realo, 2009; Robins, Trzesniewski, Tracy, Gosling, & Potter, 2002). Whereas the findings of Robins et al. (2002) are relatively

similar to the longitudinal evidence reviewed above, the results of McMullin and Cairney (2004) and Pullmann et al. (2009) diverge more strongly. A possible explanation for this inconsistency is that cross-sectional data generally suffer from important limitations, such as confounding age-related changes with cohort effects (Baltes, Cornelius, & Nesselroade, 1979). To overcome this problem, cohort-sequential data are required, that is, longitudinal data from multiple birth cohorts. Then, growth curve analyses allow testing whether a single coherent trajectory can be modeled across cohorts or whether cohort membership accounts for systematic differences in the growth factors of the lifespan trajectory (Duncan, Duncan, & Strycker, 2006; Preacher, Wichman, MacCallum, & Briggs, 2008).

In fact, there is an ongoing debate about whether there have been generational changes in self-esteem development during the past decades (Gentile, Twenge, & Campbell, 2010; Trzesniewski & Donnellan, 2009, 2010; Twenge & Campbell, 2001). On the one hand, it is possible that sociocultural changes have influenced the self-esteem trajectory of recent generations (including both the level and shape of the trajectory). For example, secular changes such as an increasing cultural focus on self-esteem (in families, schools, workplaces, and the media) and the advent of social media with increasing possibilities for self-presentation might lead to a higher level and/or a steeper increase in self-esteem. On the other hand, findings from cohort-sequential studies do not support the claim of generational changes in the self-esteem trajectory, either in the overall level or in the shape of the trajectory (Erol & Orth, 2011; Orth et al., 2012; Orth et al., 2010). Instead, the evidence suggests that the average lifespan trajectory has not changed over the last century. Nevertheless, in the present research we will test for generational changes in self-esteem, given that previous cohort-sequential studies were based exclusively on data from the United States.

Previous research has tested for factors that explain individual differences in the lifespan trajectory of self-esteem. Although, on average, self-esteem changes according to the normative trajectory described earlier, individuals differ substantially in the particular trajectory they follow—interindividual variability that is captured by the variances of growth factors in latent growth curve models. For example, in the United States, ethnic minorities did not show the same self-esteem trajectory as majority group members: whereas the trajectory of Blacks (compared to Whites) was more positive during young adulthood (Erol & Orth, 2011), their self-esteem declined much more sharply in older adulthood (Orth et al., 2010). Moreover, individuals with higher levels of education reported higher self-esteem across the lifespan compared to individuals with lower levels of education (Orth et al., 2012; Orth et al., 2010). Also, as suggested by the theoretical perspectives outlined above, empirical evidence indicates that success in the domains of relationships, work, and health moderates the lifespan trajectory (Orth et al., 2010; Wagner, Lüdtke, et al., 2013). In addition, the available data suggest that emotional stability, conscientiousness, and extraversion predict more positive self-esteem trajectories (Erol & Orth, 2011; Wagner, Lüdtke, et al., 2013).

The Present Research

The first goal of this research was to examine the lifespan trajectory of self-esteem, using longitudinal data from a large sample from Germany. We tested which of several growth models (intercept-only, linear, quadratic, and cubic) yields the best fit to the data. Given that previous studies on the lifespan trajectory were based on samples from the United States, the present study allows evaluating whether the U.S. findings replicate in a different cultural context. The second goal was to use the cohort-sequential design of the present research for testing whether there is evidence of generational changes in the lifespan trajectory. The third goal was to test for

moderators of the self-esteem trajectory. Specifically, we tested for the effects of demographic variables (gender, education, residence in West vs. East Germany) and covariates in the domains of relationships (relationship status, relationship satisfaction), work (employment status, job satisfaction), wealth (individual income, household income), and physical health (health satisfaction).

Moreover, we had two methodological goals. First, we tested whether the self-esteem measure used showed measurement invariance across cohorts and time. Measurement invariance is essential for growth modeling because scores for different cohorts and scores at different waves are comparable only when measurement invariance holds (Edwards & Wirth, 2009; Widaman, Ferrer, & Conger, 2010). Thus, results of growth curve analyses are valid only under the assumption of measurement invariance—an assumption that is, however, rarely tested in research on self-esteem development. Therefore, in a series of increasingly restricted measurement models, we tested for measurement invariance across time (i.e., three waves of data) and across birth cohorts. A second methodological goal was to build on the analyses of measurement models and to examine self-esteem as a latent construct. The crucial advantage of using latent, instead of observed, indicators in growth curve analyses is that the biasing influence of measurement error (which may be substantial) is controlled for (Cole & Preacher, 2014).

Method

The data come from the study *Gerechtigkeit als innerdeutsches Problem* (GiP; Schmitt & Maes, 1998, 2002), a longitudinal study designed to examine the psychological consequences of German reunification in the Western and Eastern part of Germany (i.e., the two separate countries from 1949 to 1990). The main focus of the study was on the quality of life after reunification in 1990. Participants were assessed in 1996, 1998, and 2000. Random samples of

participants were recruited on the basis of a geographical division of Germany into 18 cells, by crossing the three factors (a) West vs. East, (b) North, Center, and South, and (c) small, medium-sized, and large communities. For each cell, resident registration offices provided probability samples from the population of all inhabitants between 15 and 75 years of age. Additional respondents were randomly drawn from telephone directories. Overall, about 32,000 individuals were invited to participate in the study. A total of 3,170 individuals (i.e., 10%) agreed to participate in the study and were sent questionnaires; of these, 2,531 (i.e., 80% of those who agreed) participated in the study. For the present research, we excluded 22 participants whose age was unknown or who did not provide data on self-esteem at any of the three assessments.

Participants

The sample consisted of 2,509 individuals (40% female). Mean age of participants at Wave 1 was 47.6 years ($SD = 15.8$). The age range across waves was 14 to 89 years. Data on study variables were available for 2,509 individuals at Wave 1, 1,162 individuals at Wave 2, and 725 individuals at Wave 3. To investigate the potential impact of attrition, we compared individuals who did and did not participate in the most recent wave of data collection (2000) on study variables assessed at the first wave (1996). Participants who dropped out were more likely to be younger ($M_s = 46.6$ vs. 50.2 years; $d = -0.23$), have lower levels of education ($M_s = 2.28$ vs. 2.57 ; $d = -0.23$; the scale ranged from 1 to 4; for further information on the measures, see below), and have lower individual income ($M_s = 5.24$ vs. 5.48 ; $d = -0.10$; the scale ranged from 1 to 12) and household income ($M_s = 5.89$ vs. 6.13 ; $d = -0.12$; the scale ranged from 1 to 12); differences in self-esteem, relationship status, relationship satisfaction, employment status, job satisfaction, and health satisfaction were all nonsignificant. Given that all of these differences were small or nonsignificant, nonrepresentativeness due to attrition was not a serious concern in

the present study. Overall, the sample was nationally representative on many, but not all, demographic variables; men and participants with higher education are overrepresented. Table 1 gives an overview of gender and residence in West versus East Germany, for the full sample and separately for six age groups. A detailed description of the sample is available in German on the Internet (Schmal, Maes, & Schmitt, 1996).

Measures

Self-esteem. Self-esteem was assessed with a German translation of the 10-item Rosenberg Self-Esteem Scale (RSE; Rosenberg, 1965), the most commonly used and well-validated measure of self-esteem (Robins et al., 2001), using a 6-point scale ranging from 0 (*strongly disagree*) to 5 (*strongly agree*), with $M = 3.95$ ($SD = 0.73$) averaged across waves. The alpha reliability was .84 at Wave 1 and .85 at Waves 2 and 3.

Relationship status. Relationship status was assessed with a dichotomous item: “Do you have a relationship partner?” At Waves 1 to 3, 74%, 81%, and 84%, respectively, of the participants were in a relationship.

Relationship satisfaction. Relationship satisfaction was assessed with five items (Schmitt, Maes, & Schmal, 1997). An example item is “[I am satisfied/dissatisfied] with the degree of tenderness and attention my partner shows to me.” Responses were measured on a 6-point scale ranging from 0 (*very dissatisfied*) to 5 (*very satisfied*), with $M = 4.05$ ($SD = 1.04$) averaged across waves. The alpha reliability was .93 at each wave.

Employment status. We used a dichotomous variable contrasting employed and unemployed participants. At Waves 1 to 3, 71%, 59%, and 61%, respectively, of the participants were employed.

Job satisfaction. Job satisfaction was assessed with five items (Schmitt et al., 1997). An example item is “[I am satisfied/dissatisfied] with the degree of success I have in my job.” Responses were measured on a 6-point scale ranging from 0 (*very dissatisfied*) to 5 (*very satisfied*), with $M = 3.26$ ($SD = 1.18$) averaged across waves. The alpha reliability was .81 at Wave 1, .86 at Wave 2, and .85 at Wave 3.

Individual income. Individual income was assessed with a 12-point measure, ranging from 1 (less than 500 Deutsche mark per month) to 12 (8,000 Deutsche mark or more, per month). The mean was 5.48 ($SD = 2.42$) averaged across waves.

Household income. Household income was assessed with a 12-point measure, ranging from 1 (less than 500 Deutsche mark per month) to 12 (15,000 Deutsche mark or more, per month). The mean was 6.08 ($SD = 2.00$) averaged across waves.

Health satisfaction. Health satisfaction was assessed with five items (Schmitt et al., 1997). An example item is “[I am satisfied/dissatisfied] with the state of my physical health.” Responses were measured on a 6-point scale ranging from 0 (*very dissatisfied*) to 5 (*very satisfied*), with $M = 3.38$ ($SD = 1.08$) averaged across waves. The alpha reliability was .89 at Wave 1, .91 at Wave 2, and .90 at Wave 3.

Education. We used a 4-point measure of education (1 = *degree after the obligatory school years, typically 9 or 10 years, or no degree*; 2 = *academic-track high school degree, typically 12 or 13 school years*; 3 = *degree from a “Fachhochschule,” a type of German college that focuses on applied sciences*; 4 = *master’s degree from a university or a higher degree such as Ph.D., M.D., etc.*). For most participants, due to their age, level of education was invariant across waves, so we used the highest degree that participants reported across waves as a time-invariant covariate in the analyses. The mean was 2.36 ($SD = 1.28$).

Statistical Analyses

Analyses were conducted using the Mplus 7.2 program (Muthén & Muthén, 2012). To deal with missing values, we employed full information maximum likelihood estimation to fit models directly to the raw data, which produces less biased and more reliable results compared with conventional methods of dealing with missing data, such as listwise or pairwise deletion (Schafer & Graham, 2002; Widaman, 2006).

In the analyses of measurement models using item parcels as indicators, the estimator used was maximum likelihood. In measurement models using individual items as indicators, items were analyzed as ordered-categorical variables, using the mean- and variance-adjusted weighted least square (WLSMV) estimator. Fit was assessed by the comparative fit index (CFI), the Tucker-Lewis index (TLI), and the root-mean-square error of approximation (RMSEA), based on the recommendations of Hu and Bentler (1999) and MacCallum and Austin (2000). Hu and Bentler (1999) suggest that good fit is indicated by values greater than or equal to .95 for CFI and TLI, and less than or equal to .06 for RMSEA. To test for differences in model fit, we used the test of small difference in fit recommended by MacCallum, Browne, and Cai (2006, Program C). For these tests, statistical power was high with values above .99 (MacCallum et al., 2006, Program D).

In the analyses of growth curve models, which were based on individually varying times of measurement, the estimator used was robust maximum likelihood. For these models, CFI, TLI, and RMSEA were not available; therefore, fit was assessed using the Akaike information criterion (AIC) and Bayesian information criterion (BIC). For AIC and BIC, absolute values cannot be interpreted, but when comparing models, lower values indicate better model fit (Burnham & Anderson, 2004).

Results

Measurement Invariance of Self-Esteem

Before examining the lifespan trajectory of self-esteem, we tested whether the self-esteem measure used showed measurement invariance. In testing for measurement invariance, we followed the procedures described by Widaman et al. (2010). First, we examined measurement invariance across time. Figure 1 provides an illustration of the measurement model used. Item parcels were used as indicators of the latent factors because parcels produce more reliable latent variables than individual items (Little, Cunningham, Shahar, & Widaman, 2002). Parcels were created in identical ways across waves, using the balancing technique recommended by Little, Rhemtulla, Gibson, and Schoemann (2013), and examined as continuous variables. The three latent self-esteem factors were allowed to correlate across waves. Moreover, the error variances of each parcel were allowed to correlate across waves to control for bias due to parcel-specific variance (Cole & Maxwell, 2003). In the measurement models, the mean and variance of the first latent factor was fixed to 0 and 1, respectively, so that all loadings and intercepts could be estimated. The first measurement model (i.e., Model 1) included configural invariance. The fit of this model was good (Table 2). Models 2 and 3 tested weak and strong invariance by progressively constraining the loadings and intercepts of indicators, respectively, to be equal across waves. As indicated by the test of small difference in fit (MacCallum et al., 2006), the constraints did not significantly worsen model fit, suggesting strong measurement invariance across time.

Next, we examined measurement invariance across birth cohorts, using multi-group models. We created six cohorts using age at Wave 1 (i.e., 14–29, 30–39, 40–49, 50–59, 60–69, and 70 years and older; the youngest and oldest cohorts covered more than 10 years due to

restrictions in sample size). Model 4 tested for configural invariance across cohorts, accounting for strong invariance across time (i.e., building on Model 3). The fit of this model was good (Table 2). Models 5 and 6 tested weak and strong invariance across cohorts by progressively constraining the loadings and intercepts of indicators. As indicated by the test of small difference in fit, the constraints did not significantly worsen model fit, suggesting strong measurement invariance across birth cohorts.

Given that the use of item parcels is not unequivocally supported in the methodological literature (for the debate, see, e.g., Little et al., 2013; Marsh, Lüdtke, Nagengast, Morin, & Von Davier, 2013), we also tested for measurement invariance on the item level. We accounted for the Likert-type response scale of the RSE by using item factor analysis with categorical indicators (Wirth & Edwards, 2007). The model was similar to the parcel-level measurement model described above, except that the item-level model required including wave-specific method factors that accounted for bias due to positive and negative wording of the items (Marsh, Scalas, & Nagengast, 2010). Both the positive and negative wording factors were correlated across waves, but positive wording factors were uncorrelated with negative wording factors, and all wording factors were uncorrelated with the self-esteem factors. Table 2 shows the fit of the models testing for measurement invariance across waves. Model 7 included configural invariance, and Models 8 and 9 tested weak and strong invariance by progressively constraining the loadings and thresholds of indicators, respectively, to be equal across waves. The fit of the models was good. Moreover, as indicated by the test of small difference in fit, the constraints did not significantly worsen model fit, suggesting strong measurement invariance across time. We also examined multi-group item-level models to test for measurement invariance across cohorts; however, none of these multi-group models converged, which is likely due to the computational

complexity of item factor analysis. Nevertheless, given the findings for the full sample, the item-level analyses support the conclusion from the parcel-level analyses that strong measurement invariance holds for the self-esteem measure used in the present research.

Lifespan Trajectory of Self-Esteem

Next, we examined the lifespan trajectory of self-esteem by using latent growth curve models that capture the development of self-esteem across the entire age range represented in the sample. Although each participant provided data for at most three age points, the complete lifespan trajectory was constructed using the information from all participants simultaneously. This approach is based on the assumption (which is tested below) that a common trajectory can be modeled across all cohorts included in the sample (Duncan et al., 2006; Preacher et al., 2008). Given that the measurement was asynchronous across age (i.e., the data are organized by waves, but we were interested in another metric of time, specifically the individual's age at each wave), we employed individual slope loadings following recommendations by Mehta and West (2000), Bollen and Curran (2006), and Preacher et al. (2008).

Similarly to the measurement models described above, self-esteem was examined as a latent construct, as shown in Figure 1. The model accounted for strong measurement invariance. For scaling the latent self-esteem scores, we followed the standardization method by Ferrer, Balluerka, and Widaman (2008). Because in the measurement models the mean and variance of the first latent self-esteem factor were fixed to 0 and 1, respectively (resulting in a standardized metric in which self-esteem scores have a mean of 0 and a standard deviation of 1, relative to Wave 1), this standardized metric could be carried over to the growth models by constraining the first factor loading to the parameter estimate from the measurement model with strong invariance (Ferrer et al., 2008). Given that we examined the sample as a whole (but did not use a multi-

group model with separate cohorts), we used the loading estimate from Model 3, which was 0.705.

We estimated a model with an intercept only, and linear, quadratic, and cubic growth curve models (Preacher et al., 2008). Because the slope loadings are based on age rather than the three measurement occasions, it was possible to estimate relatively complex trajectories. For the growth curve analyses, age was centered at 50 years and rescaled by the factor 10^{-2} to avoid numerically small estimates related to slope factors and to yield greater precision for these estimates. According to AIC the quadratic model had the best fit to the data, whereas according to BIC the linear model had the best fit (Table 3). We therefore considered additional evidence for model selection. (a) First, we examined the means and variances of the latent growth factors. In the linear model, one of the coefficients was nonsignificant, specifically the variance of the linear slope ($p = .110$). Likewise, in the quadratic model, one of the coefficients was nonsignificant, specifically the variance of the quadratic slope ($p = .084$). Although these coefficients did not meet an alpha level of .05, the means and variances of the growth factors overall suggested that both linear and quadratic slope factors are needed to capture the general trend and individual differences in the self-esteem trajectory. (b) Second, we examined linear and quadratic models of the cross-sectional age differences in self-esteem at Wave 1; the results clearly favored the quadratic over the linear model. The results of the cross-sectional analyses are reported in detail in the supplementary material. (c) Third, as reviewed in the Introduction, previous research suggests that a quadratic trajectory is a better model of the lifespan trajectory of self-esteem compared to a linear trajectory. (d) Fourth, the methodological literature suggests that in situations where the true model is not included in the set of models tested, AIC might be more appropriate than BIC to select the best-fitting model (Burnham & Anderson, 2004). Given

that the models tested are only approximations of the true trajectory, in the present research AIC might be the more useful criterion for model selection. For these reasons, we favored the quadratic model over the linear model.

Figure 2 shows the average predicted trajectory of self-esteem for the full sample. Self-esteem tended to increase during adolescence, young adulthood, and middle adulthood, reaching a peak at age 60, and then declined in old age. There was about a one half standard deviation increase ($d = 0.53$) from age 14 to 60 and about a one fifth standard deviation decrease ($d = -0.22$) from age 60 to 89 years. Overall, the trajectory is similar to the lifespan trajectory found in previous longitudinal studies (Orth et al., 2012; Orth et al., 2010).

Testing for Generational Changes in the Self-Esteem Trajectory

Next, we tested for cohort effects on the trajectory of self-esteem. As discussed in the Introduction, it is possible that sociocultural changes during the 20th century have influenced the lifespan trajectory of self-esteem. To disentangle the effects of aging and cohort, we estimated a conditional growth curve model in which the growth factors were regressed on birth cohort. The results indicated that birth cohort did not significantly predict any of the growth factors (including the intercept factor, linear slope, and quadratic slope; see Table 4). We concluded that there were no systematic generational changes in the level and shape of the self-esteem trajectory across the birth cohorts included in the present sample. Thus, the evidence suggests that modeling a single coherent trajectory across the observed age range—as described above—is appropriate. These findings are consistent with the results of previous cohort-sequential longitudinal studies (Erol & Orth, 2011; Orth et al., 2012; Orth et al., 2010).

Moderators of the Self-Esteem Trajectory

Then, we estimated conditional growth curve models to examine the moderating effects of gender, education, and residence (West vs. East Germany) on the self-esteem trajectory. Gender and residence were dummy-coded and education was centered for these analyses. For all variables, none of the effects on the intercept or on the linear and quadratic slopes were significant (Table 4). We also tested for two-way and three-way interaction effects between these covariates; all interaction effects were nonsignificant.

Finally, we examined the effects of time-varying covariates (TVCs) on the self-esteem trajectory. Given that variables such as relationship status and income may change over time, it is important that the model accounts for potential changes in the TVCs. Figure 3 shows the generic model that was used for the analyses. In this model, self-esteem at specific waves is explained simultaneously by the growth factors and a repeatedly measured TVC (Bollen & Curran, 2006; Preacher et al., 2008). The model estimates the effect of the TVC on self-esteem while simultaneously controlling for systematic growth in self-esteem; in other words, the model tests whether the TVC predicts deviations from the expected self-esteem trajectory. Dichotomous TVCs were dummy-coded and continuous TVCs were converted to z scores for the analyses. The results indicated that relationship satisfaction, employment status, job satisfaction, household income, and health satisfaction had significant TVC effects (Table 5). Given that self-esteem and continuous TVCs were measured in a standardized metric and dichotomous TVCs were dummy-coded, the unstandardized coefficients reported in Table 5 can be readily interpreted. For example, for relationship satisfaction the coefficient was 0.19, indicating that when relationship satisfaction of two individuals differs by 1 SD , a difference of 0.19 SD s in self-esteem is predicted. Another example is employment status; its coefficient was 0.15, indicating that at each

wave the self-esteem of employed individuals was predicted to be 0.15 *SDs* higher than the self-esteem of unemployed individuals.

Discussion

In this paper, we examined the development of self-esteem across the lifespan, using longitudinal data from a large sample. Latent growth curve analyses indicated that self-esteem follows a quadratic trajectory across the lifespan, increasing during adolescence, young adulthood, and middle adulthood, reaching a peak at age 60 years, and then declining in old age. No cohort effects on average levels of self-esteem or on the shape of the trajectory were found. Moreover, the trajectory did not differ across gender and level of education. However, the results suggested that employment status, household income, and satisfaction in the domains of work, relationships, and health contribute to a more positive lifespan trajectory of self-esteem.

Implications of the Findings

The present research replicates in a German sample the curvilinear trajectory of self-esteem across the lifespan found in two previous studies using samples from the United States (Orth et al., 2012; Orth et al., 2010). Overall, the shape of the trajectory was similar in all three studies. Across studies, the peak of the trajectory was estimated to occur between age 51 and 60 years. However, effect sizes of the increases and decreases over the life course should be considered to compare the findings across studies more closely. Whereas the increase from adolescence (or young adulthood, respectively; the sample examined in Orth et al., 2010, did not include participants younger than 25 years) to midlife corresponded to about one third to one half of a standard deviation in all studies, the effect sizes of the decrease from midlife to old age differed more strongly. Whereas in previous studies the decline corresponded to about two thirds of a standard deviation (Orth et al., 2012; Orth et al., 2010), in the present study there was a

smaller decline of about one fifth of a standard deviation. A possible explanation is that the sample of the present study came from a different country (Germany) compared to previous studies (United States). Given that negative changes in health and socioeconomic status partially explain the self-esteem drop in old age (Orth et al., 2010), cross-cultural differences in covariates might account for diverging self-esteem trajectories among older adults. A promising way to gain more precise knowledge about the magnitude of self-esteem change in old age, and about significant moderators of change, is provided by meta-analytic methods. Although in a recent meta-analysis few samples from old age were available (i.e., there were four samples of adults 60 years or older; Huang, 2010), it is likely that the number of studies will increase in the coming years (e.g., Wagner et al., 2014). Nevertheless, with regard to the overall pattern of the lifespan trajectory, the available data provide converging evidence that self-esteem increases from adolescence to midlife and then decreases in old age.

The findings suggest that predictors from several life domains are important in explaining interindividual variability in the self-esteem trajectory. The TVC analyses show that satisfaction in the relationship, work, and health domains have significant effects on self-esteem, over and above normative age trends in self-esteem. Moreover, in addition to these subjective indicators of well-being, significant effects emerged for two objective measures of life outcomes (i.e., employment status and household income), which showed the same pattern as the subjective measures. With regard to gender differences, the present findings converge with findings from previous studies. In this study, men and women did not differ in the level and shape of the trajectory; similarly, in previous longitudinal studies the gender difference was nonsignificant (Erol & Orth, 2011; Orth et al., 2012) or small (Orth et al., 2010; Wagner, Lüdtke, et al., 2013).

Further evidence on the robustness of the findings is provided by the fact that the trajectory replicated across the two subsamples of participants who had lived continuously in either East or West Germany. The finding is important because these two parts of Germany were separate states from 1949 to 1990, with a low level of exchange between the populations (in terms of migration and travel) and important political, economic, and social differences, so that two relatively distinct cultural systems emerged (cf. Schmitt & Maes, 1998, 2002). Despite these differences, however, East and West Germans showed the same pattern of self-esteem development, providing further evidence for the cross-cultural generalizability of the curvilinear pattern of the lifespan trajectory.

The findings of the present study are consistent with hypotheses about the lifespan development of self-esteem derived from neo-socioanalytic theory (Roberts & Wood, 2006; see also Roberts et al., 2008). As described in the Introduction, the theory proposes that individual characteristics such as self-esteem can change across the whole life course. Specifically, the theory suggests that self-esteem shows systematic increase during young and middle adulthood, because people typically invest strongly in important social roles during these developmental periods, which—according to the social investment principle and the maturity principle—strengthens adaptive personality characteristics, including self-esteem. For old age, the theory suggests that self-esteem might no longer show increase but rather decrease, as old age frequently includes negative changes in social roles. The present findings correspond to the depicted shape of the lifespan trajectory and suggest that the degree of success in social roles in the relationship and work domains moderates the self-esteem trajectory. In future research, it would be highly interesting to test in more detail how social roles influence the individual's self-

esteem, by assuming specific roles (such as the roles of spouse, parent, and supervisor), committing oneself to a role, investing in a role, or dropping out of important roles.

The present study provides evidence with regard to the debate about whether more recent generations experience a higher level and/or a steeper increase in self-esteem than did previous generations (Trzesniewski & Donnellan, 2010; Twenge & Campbell, 2001). Although the hypothesis that sociocultural changes (such as greater cultural importance placed on self-esteem and grade inflation in education) have led to generational increases in self-esteem is plausible, the present study suggests that the typical lifespan trajectory has not changed across the generations born in the past century in Germany (neither the overall level nor the shape of the trajectory), which is consistent with the findings from previous longitudinal studies on the lifespan trajectory of self-esteem (Orth et al., 2012; Orth et al., 2010).

Limitations and Future Directions

One limitation of the present study is that the data were collected across a 4-year interval only. However, although a longer study period would clearly have been desirable, the longitudinal design of the data is valuable because it allowed examining patterns of *intraindividual* change, which is essential for the study of developmental trajectories. Moreover, given that the trajectories were not confounded by cohort effects, the present data provide valid insights into the trajectory that would be found if individuals were followed across the full time span from adolescence to old age. Another limitation is the relatively low response rate, which might have introduced sample selectivity. Nevertheless, the sample was nationally representative with regard to many demographic characteristics (Schmal et al., 1996). Moreover, the mean self-esteem score of the present sample is very close to normative data for the German version of the RSE, on the basis of a nationally representative sample of 4,988 individuals aged 14 to 92 years

(Roth, Decker, Herzberg, & Brähler, 2008). A further limitation is that parts of the sample dropped out of the study between the first and last assessment. However, the fact that attrition effects on all study variables were small or nonsignificant (in particular, there was no attrition effect for self-esteem) suggests that the conclusions of the present research are not biased by attrition. In addition, a disadvantage of the study is that the sample did not include participants younger than 14 years; thus, the present study provides no information on the self-esteem trajectory in childhood. Although theory and empirical studies suggest that self-esteem declines during middle childhood (e.g., Robins et al., 2002), the evidence from longitudinal studies is inconsistent (Cole et al., 2001; Huang, 2010; Kuzucu, Bontempo, Hofer, Stallings, & Piccinin, 2014). Future research should therefore focus more closely on the self-esteem trajectory during childhood.

Another limitation is that in the present research only linear and curvilinear models of self-esteem development were tested. Although the present results overall support the quadratic model and although the observed means (as reported in the supplementary material) suggested that a quadratic function provides a useful approximation of age differences in self-esteem, it is likely that the true change function is more complex. For example, it is possible that during late young adulthood and early middle adulthood (i.e., from about age 30 to 50 years), the increase in self-esteem is smaller than predicted by the quadratic model (see the observed means in the supplementary material). Thus, in future research it would be desirable to examine more complex change functions. To increase statistical power when testing for complex functions, future studies should include a larger number of repeated assessments than included in the present study. Nevertheless, despite the fact that the quadratic curve is only an approximation of self-esteem development from adolescence to old age, the present research advances the field by

providing evidence on the general lifespan trajectory that converges with evidence from the previous longitudinal studies on self-esteem across the lifespan (Orth et al., 2012; Orth et al., 2010).

It is worth noting that the present research used an explicit measure of self-esteem. Although, at present, explicit measures are considered the most valid measures of self-esteem (Buhrmester, Blanton, & Swann, 2011), in future research it would be interesting to study self-esteem development, and cohort effects on self-esteem, using implicit measures of self-esteem (e.g., Greenwald & Farnham, 2000). Whether studies of implicit self-esteem would yield the same pattern of results as the present research is currently unknown. In addition, in future research it would be interesting to distinguish between secure and defensive self-esteem (a distinction that is not possible based on the self-esteem measure used in the present study). Given the differing reactions of individuals with secure versus defensive self-esteem (Baumeister, Smart, & Boden, 1996; Jordan, Spencer, Zanna, Hoshino-Browne, & Correll, 2003), it is important to know whether these forms of self-esteem show the same or different normative developmental trajectories. Some evidence is provided by a cross-sectional study that examined age differences in the level, contingency, and intraindividual stability of self-esteem (Meier, Orth, Denissen, & Kühnel, 2011). The findings suggested that during young and middle adulthood self-esteem not only tends to become higher, but also less contingent and more stable (i.e., more secure).

Strengths of the present research include the large sample size, the availability of a well-validated measure of self-esteem (i.e., the full 10-item RSE), and the presence of strong measurement invariance of the self-esteem measure across assessments and birth cohorts. Moreover, although the sample is not a strict national probability sample, the study included

random samples from geographically diverse regions of Germany, which strengthens the generalizability of the results. Also, in this study self-esteem was examined as a latent construct, which allowed controlling for the confounding influence of measurement error, increasing the validity of the findings.

In conclusion, the present research improves our understanding of self-esteem development: by providing longitudinal evidence on the shape of the lifespan trajectory; by showing that the curvilinear trajectory previously found in U.S. samples replicates in the present German sample and, moreover, among individuals who had been living continuously in the two former states of West and East Germany; by providing evidence that the average level and shape of the self-esteem trajectory did not change across cohorts born in Germany between about 1910 to 1980; and by showing that level of success and well-being in the work, relationships, and health domains are important predictors of individual differences in the self-esteem trajectory. The findings have significant implications because they call attention to developmental stages in which individuals may be vulnerable due to low self-esteem (such as adolescence and old age) and to factors that predict successful versus problematic developmental trajectories.

References

- Ackerman, R. A., Witt, E. A., Donnellan, M. B., Trzesniewski, K. H., Robins, R. W., & Kashy, D. A. (2011). What does the Narcissistic Personality Inventory really measure? *Assessment, 18*, 67-87. doi: 10.1177/1073191110382845
- Baltes, P. B., Cornelius, S. W., & Nesselroade, J. R. (1979). Cohort effects in developmental psychology. In J. R. Nesselroade & P. B. Baltes (Eds.), *Longitudinal research in the study of behavior and development* (pp. 61-87). New York, NY: Academic Press.
- Baltes, P. B., & Mayer, K. U. (1999). *The Berlin Aging Study: Aging from 70 to 100*. Cambridge, England: Cambridge University Press.
- Baumeister, R. F., Smart, L., & Boden, J. M. (1996). Relation of threatened egotism to violence and aggression: The dark side of high self-esteem. *Psychological Review, 103*, 5-33. doi: 10.1037/0033-295X.103.1.5
- Birkeland, M. S., Melkevik, O., Holsen, I., & Wold, B. (2012). Trajectories of global self-esteem development during adolescence. *Journal of Adolescence, 35*, 43-54. doi: 10.1016/j.adolescence.2011.06.006
- Bollen, K. A., & Curran, P. J. (2006). *Latent curve models: A structural equation perspective*. Hoboken, NJ: Wiley.
- Buhrmester, M. D., Blanton, H., & Swann, W. B. (2011). Implicit self-esteem: Nature, measurement, and a new way forward. *Journal of Personality and Social Psychology, 100*, 365-385. doi: 10.1037/a0021341
- Burnham, K. P., & Anderson, D. R. (2004). Multimodel inference: Understanding AIC and BIC in model selection. *Sociological Methods and Research, 33*, 261-304. doi: 10.1177/0049124104268644

- Chung, J. M., Robins, R. W., Trzesniewski, K. H., Nofhle, E. E., Roberts, B. W., & Widaman, K. F. (2014). Continuity and change in self-esteem during emerging adulthood. *Journal of Personality and Social Psychology*, 106, 469-483. doi: 10.1037/a0035135
- Cole, D. A., & Maxwell, S. E. (2003). Testing mediational models with longitudinal data: Questions and tips in the use of structural equation modeling. *Journal of Abnormal Psychology*, 112, 558-577. doi: 10.1037/0021-843X.112.4.558
- Cole, D. A., Maxwell, S. E., Martin, J. M., Peeke, L. G., Seroczynski, A. D., Tram, J. M., . . . Maschman, T. (2001). The development of multiple domains of child and adolescent self-concept: a cohort sequential longitudinal design. *Child Development*, 72, 1723-1746. doi: 10.1111/1467-8624.00375
- Cole, D. A., & Preacher, K. J. (2014). Manifest variable path analysis: Potentially serious and misleading consequences due to uncorrected measurement error. *Psychological Methods*, 19, 300-315. doi: 10.1037/a0033805
- Donnellan, M. B., Trzesniewski, K. H., & Robins, R. W. (2011). Self-esteem: Enduring issues and controversies. In T. Chamorro-Premuzic, S. von Stumm & A. Furnham (Eds.), *The Wiley-Blackwell handbook of individual differences* (pp. 718-746). Chichester, UK: Wiley-Blackwell.
- Duncan, T. E., Duncan, S. C., & Strycker, L. A. (2006). *An introduction to latent variable growth curve modeling: Concepts, issues, and applications*. Mahwah, NJ: Erlbaum.
- Edwards, M. C., & Wirth, R. J. (2009). Measurement and the study of change. *Research in Human Development*, 6, 74-96. doi: 10.1080/15427600902911163

- Erol, R. Y., & Orth, U. (2011). Self-esteem development from age 14 to 30 years: A longitudinal study. *Journal of Personality and Social Psychology*, 101, 607-619. doi: 10.1037/a0024299
- Ferrer, E., Balluerka, N., & Widaman, K. F. (2008). Factorial invariance and the specification of second-order latent growth models. *Methodology*, 4, 22-36. doi: 10.1027/1614-2241.4.1.22
- Gentile, B., Twenge, J. M., & Campbell, W. K. (2010). Birth cohort differences in self-esteem, 1988-2008: A cross-temporal meta-analysis. *Review of General Psychology*, 14, 261-268. doi: 10.1037/a0019919
- Greenwald, A. G., & Farnham, S. D. (2000). Using the Implicit Association Test to measure self-esteem and self-concept. *Journal of Personality and Social Psychology*, 79, 1022-1038. doi: 10.1037/0022-3514.79.6.1022
- Harter, S. (2006). Developmental and individual difference perspectives on self-esteem. In D. K. Mroczek & T. D. Little (Eds.), *Handbook of personality development* (pp. 311-334). Mahwah, NJ: Erlbaum.
- Heine, S. J., Lehman, D. R., Markus, H. R., & Kitayama, S. (1999). Is there a universal need for positive self-regard? *Psychological Review*, 106, 766-794. doi: 10.1037/0033-295X.106.4.766
- Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, 6, 1-55. doi: 10.1080/10705519909540118

- Huang, C. (2010). Mean-level change in self-esteem from childhood through adulthood: Meta-analysis of longitudinal studies. *Review of General Psychology, 14*, 251-260. doi: 10.1037/a0020543
- Hutteman, R., Hennecke, M., Orth, U., Reitz, A. K., & Specht, J. (2014). Developmental tasks as a framework to study personality development in adulthood and old age. *European Journal of Personality, 28*, 267-278. doi: 10.1002/per.1959
- Jordan, C. H., Spencer, S. J., Zanna, M. P., Hoshino-Browne, E., & Correll, J. (2003). Secure and defensive high self-esteem. *Journal of Personality and Social Psychology, 85*, 969-978. doi: 10.1037/0022-3514.85.5.969
- Kuster, F., & Orth, U. (2013). The long-term stability of self-esteem: Its time-dependent decay and nonzero asymptote. *Personality and Social Psychology Bulletin, 39*, 677-690. doi: 10.1177/0146167213480189
- Kuster, F., Orth, U., & Meier, L. L. (2013). High self-esteem prospectively predicts better work conditions and outcomes. *Social Psychological and Personality Science, 4*, 668-675. doi: 10.1177/1948550613479806
- Kuzucu, Y., Bontempo, D. E., Hofer, S. M., Stallings, M. C., & Piccinin, A. M. (2014). Developmental change and time-specific variation in global and specific aspects of self-concept in adolescence and association with depressive symptoms. *Journal of Early Adolescence, 34*, 638-666. doi: 10.1177/0272431613507498
- Leary, M. R., & Baumeister, R. F. (2000). The nature and function of self-esteem: Sociometer theory. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 32, pp. 1-62). San Diego, CA: Academic Press.

- Little, T. D., Cunningham, W. A., Shahar, G., & Widaman, K. F. (2002). To parcel or not to parcel: Exploring the question, weighing the merits. *Structural Equation Modeling*, 9, 151-173. doi: 10.1207/S15328007SEM0902_1
- Little, T. D., Rhemtulla, M., Gibson, K., & Schoemann, A. M. (2013). Why the items versus parcels controversy needn't be one. *Psychological Methods*, 18, 285-300. doi: 10.1037/a0033266
- Lucas, R. E., & Donnellan, M. B. (2011). Personality development across the life span: Longitudinal analyses with a national sample from Germany. *Journal of Personality and Social Psychology*, 101, 847-861. doi: 10.1037/a0024298
- MacCallum, R. C., & Austin, J. T. (2000). Applications of structural equation modeling in psychological research. *Annual Review of Psychology*, 51, 201-226. doi: 10.1146/annurev.psych.51.1.201
- MacCallum, R. C., Browne, M. W., & Cai, L. (2006). Testing differences between nested covariance structure models: Power analysis and null hypotheses. *Psychological Methods*, 11, 19-35. doi: 10.1037/1082-989X.11.1.19
- MacDonald, G., & Leary, M. R. (2012). Individual differences in self-esteem. In M. R. Leary & J. P. Tangney (Eds.), *Handbook of self and identity* (pp. 354-377). New York, NY: Guilford.
- Markus, H. R., & Kitayama, S. (1991). Culture and the self: Implications for cognition, emotion, and motivation. *Psychological Review*, 98, 224-253. doi: 10.1037/0033-295X.98.2.224
- Marsh, H. W., Lüdtke, O., Nagengast, B., Morin, A. J. S., & Von Davier, M. (2013). Why item parcels are (almost) never appropriate: Two wrongs do not make a right—camouflaging

- misspecification with item parcels in CFA models. *Psychological Methods*, 18, 257-284.
doi: 10.1037/a0032773
- Marsh, H. W., Nagengast, B., & Morin, A. J. S. (2013). Measurement invariance of Big-Five factors over the life span: ESEM tests of gender, age, plasticity, maturity, and la dolce vita effects. *Developmental Psychology*, 49, 1194-1218. doi: 10.1037/a0026913
- Marsh, H. W., Scalas, L. F., & Nagengast, B. (2010). Longitudinal tests of competing factor structures for the Rosenberg Self-Esteem Scale: Traits, ephemeral artifacts, and stable response styles. *Psychological Assessment*, 22, 366-381. doi: 10.1037/a0019225
- Marshall, S. L., Parker, P. D., Ciarrochi, J., & Heaven, P. C. L. (2014). Is self-esteem a cause or consequence of social support? A 4-year longitudinal study. *Child Development*, 85, 1275-1291. doi: 10.1111/cdev.12176
- McMullin, J. A., & Cairney, J. (2004). Self-esteem and the intersection of age, class, and gender. *Journal of Aging Studies*, 18, 75-90. doi: 10.1016/j.jaging.2003.09.006
- Mehta, P. D., & West, S. G. (2000). Putting the individual back into individual growth curves. *Psychological Methods*, 5, 23-43. doi: 10.1037/1082-989X.5.1.23
- Meier, L. L., Orth, U., Denissen, J. J. A., & Kühnel, A. (2011). Age differences in instability, contingency, and level of self-esteem across the life span. *Journal of Research in Personality*, 45, 604-612. doi: 10.1016/j.jrp.2011.08.008
- Muthén, L. K., & Muthén, B. O. (2012). *Mplus user's guide: Seventh edition*. Los Angeles, CA: Muthén and Muthén.
- Orth, U., & Robins, R. W. (2014). The development of self-esteem. *Current Directions in Psychological Science*, 23, 381-387. doi: 10.1177/0963721414547414

- Orth, U., Robins, R. W., & Widaman, K. F. (2012). Life-span development of self-esteem and its effects on important life outcomes. *Journal of Personality and Social Psychology*, 102, 1271-1288. doi: 10.1037/a0025558
- Orth, U., Trzesniewski, K. H., & Robins, R. W. (2010). Self-esteem development from young adulthood to old age: A cohort-sequential longitudinal study. *Journal of Personality and Social Psychology*, 98, 645-658. doi: 10.1037/a0018769
- Preacher, K. J., Wichman, A. L., MacCallum, R. C., & Briggs, N. E. (2008). *Latent growth curve modeling*. Los Angeles: Sage.
- Pullmann, H., Allik, J., & Realo, A. (2009). Global self-esteem across the life span: A cross-sectional comparison between representative and self-selected internet samples. *Experimental Aging Research*, 35, 20-44. doi: 10.1080/03610730802544708
- Roberts, B. W., & DelVecchio, W. F. (2000). The rank-order consistency of personality traits from childhood to old age: A quantitative review of longitudinal studies. *Psychological Bulletin*, 126, 3-25. doi: 10.1037/0033-2909.126.1.3
- Roberts, B. W., & Wood, D. (2006). Personality development in the context of the neo-socioanalytic model of personality. In D. K. Mroczek & T. D. Little (Eds.), *Handbook of personality development* (pp. 11-39). Mahwah, NJ: Erlbaum.
- Roberts, B. W., Wood, D., & Caspi, A. (2008). The development of personality traits in adulthood. In O. P. John, R. W. Robins & L. A. Pervin (Eds.), *Handbook of personality: Theory and research* (pp. 375-398). New York, NY: Guilford.
- Robins, R. W., Hendin, H. M., & Trzesniewski, K. H. (2001). Measuring global self-esteem: Construct validation of a single-item measure and the Rosenberg Self-Esteem Scale.

- Personality and Social Psychology Bulletin*, 27, 151-161. doi: 10.1177/0146167201272002
- Robins, R. W., Trzesniewski, K. H., Tracy, J. L., Gosling, S. D., & Potter, J. (2002). Global self-esteem across the life span. *Psychology and Aging*, 17, 423-434. doi: 10.1037//0882-7974.17.3.423
- Rosenberg, M. (1965). *Society and the adolescent self-image*. Princeton, NJ: Princeton University Press.
- Roth, M., Decker, O., Herzberg, P. Y., & Brähler, E. (2008). Dimensionality and norms of the Rosenberg Self-Esteem Scale in a German general population sample. *European Journal of Psychological Assessment*, 24, 190-197. doi: 10.1027/1015-5759.24.3.190
- Schafer, J. L., & Graham, J. W. (2002). Missing data: Our view of the state of the art. *Psychological Methods*, 7, 147-177. doi: 10.1037/1082-989X.7.2.147
- Schmal, A., Maes, J., & Schmitt, M. (1996). Gerechtigkeit als innerdeutsches Problem: Untersuchungsplan und Stichprobe. (Berichte aus der Arbeitsgruppe "Verantwortung, Gerechtigkeit, Moral" Nr. 105). Trier: Universität Trier, Fachbereich I - Psychologie; <http://www.gerechtigkeitsforschung.de/berichte/beri096.pdf>.
- Schmitt, M., & Maes, J. (1998). Perceived injustice in unified Germany and mental health. *Social Justice Research*, 11, 59-78. doi: 10.1023/A:1022133020802
- Schmitt, M., & Maes, J. (2002). Stereotypic ingroup bias as self-defense against relative deprivation: Evidence from a longitudinal study of the German unification process. *European Journal of Social Psychology*, 32, 309-326. doi: 10.1002/ejsp.91
- Schmitt, M., Maes, J., & Schmal, A. (1997). *Gerechtigkeit als innerdeutsches Problem: Analyse der Messeigenschaften von Indikatoren der seelischen Gesundheit*. (Berichte aus der

- Arbeitsgruppe "Verantwortung, Gerechtigkeit, Moral" Nr. 104). Trier: Universität Trier, Fachbereich I - Psychologie; <http://www.gerechtigkeitsforschung.de/berichte/beri104.pdf>.
- Sowislo, J. F., & Orth, U. (2013). Does low self-esteem predict depression and anxiety? A meta-analysis of longitudinal studies. *Psychological Bulletin*, 139, 213-240. doi: 10.1037/a0028931
- Specht, J., Bleidorn, W., Denissen, J. J. A., Hennecke, M., Hutteman, R., Kandler, C., . . . Zimmermann, J. (2014). What drives adult personality development? A comparison of theoretical perspectives and empirical evidence. *European Journal of Personality*, 28, 216-230. doi: 10.1002/per.1966
- Specht, J., Egloff, B., & Schmukle, S. C. (2011). Stability and change of personality across the life course: The impact of age and major life events on mean-level and rank-order stability of the Big Five. *Journal of Personality and Social Psychology*, 101, 862-882. doi: 10.1037/a0024950
- Steiger, A. E., Allemand, M., Robins, R. W., & Fend, H. A. (2014). Low and decreasing self-esteem during adolescence predict adult depression two decades later. *Journal of Personality and Social Psychology*, 106, 325-338. doi: 10.1037/a0035133
- Trzesniewski, K. H., & Donnellan, M. B. (2009). Reevaluating the evidence for increasingly positive self-views among high school students: More evidence for consistency across generations (1976–2006). *Psychological Science*, 20, 920-922. doi: 10.1111/j.1467-9280.2009.02361.x
- Trzesniewski, K. H., & Donnellan, M. B. (2010). Rethinking “Generation Me”: A study of cohort effects from 1976-2006. *Perspectives on Psychological Science*, 5, 58-75. doi: 10.1177/1745691609356789

- Trzesniewski, K. H., Donnellan, M. B., Moffitt, T. E., Robins, R. W., Poulton, R., & Caspi, A. (2006). Low self-esteem during adolescence predicts poor health, criminal behavior, and limited economic prospects during adulthood. *Developmental Psychology*, 42, 381-390. doi: 10.1037/0012-1649.42.2.381
- Trzesniewski, K. H., Donnellan, M. B., & Robins, R. W. (2003). Stability of self-esteem across the life span. *Journal of Personality and Social Psychology*, 84, 205-220. doi: 10.1037/0022-3514.84.1.205
- Twenge, J. M., & Campbell, W. K. (2001). Age and birth cohort differences in self-esteem: A cross-temporal meta-analysis. *Personality and Social Psychology Review*, 5, 321-344. doi: 10.1207/S15327957PSPR0504_3
- Wagner, J., Gerstorf, D., Hoppmann, C., & Luszcz, M. A. (2013). The nature and correlates of self-esteem trajectories in late life. *Journal of Personality and Social Psychology*, 105, 139-153. doi: 10.1037/a0032279
- Wagner, J., Lang, F. R., Neyer, F. J., & Wagner, G. G. (2014). Self-esteem across adulthood: The role of resources. *European Journal of Ageing*, 11, 109-119. doi: 10.1007/s10433-013-0299-z
- Wagner, J., Lüdtke, O., Jonkmann, K., & Trautwein, U. (2013). Cherish yourself: Longitudinal patterns and conditions of self-esteem change in the transition to young adulthood. *Journal of Personality and Social Psychology*, 104, 148-163. doi: 10.1037/a0029680
- Watson, D., Sulz, J., & Haig, J. (2002). Global self-esteem in relation to structural models of personality and affectivity. *Journal of Personality and Social Psychology*, 83, 185-197. doi: 10.1037/0022-3514.83.1.185

Widaman, K. F. (2006). Missing data: What to do with or without them. *Monographs of the Society for Research in Child Development*, 71, 42-64. doi: 10.1111/j.1540-5834.2006.00404.x

Widaman, K. F., Ferrer, E., & Conger, R. D. (2010). Factorial invariance within longitudinal structural equation models: Measuring the same construct across time. *Child Development Perspectives*, 4, 10-18. doi: 10.1111/j.1750-8606.2009.00110.x

Wirth, R. J., & Edwards, M. C. (2007). Item factor analysis: Current approaches and future directions. *Psychological Methods*, 12, 58-79. doi: 10.1037/1082-989X.12.1.58

Zeiders, K. H., Umaña-Taylor, A. J., & Derlan, C. L. (2013). Trajectories of depressive symptoms and self-esteem in Latino youths: Examining the role of gender and perceived discrimination. *Developmental Psychology*, 49, 951-963. doi: 10.1037/a0028866

Table 1

Demographic Characteristics of the Sample

Age at		Gender		Residence	
Wave 1	<i>N</i>	Women	Men	West Germany	East Germany
14 to 29	401	209	191	207	141
30 to 39	437	212	225	195	184
40 to 49	476	213	263	153	268
50 to 59	545	184	361	176	276
60 to 69	434	124	310	104	238
70+	216	73	143	80	96
Full sample	2509	1015	1493	915	1203

Note. Age is given in years. Residence is reported (and examined in the analyses) only for those participants who lived continuously in either West or East Germany until 1996 (i.e., Wave 1).

Table 2

Fit of Self-Esteem Measurement Models

Model	χ^2	<i>df</i>	CFI	TLI	RMSEA [90% CI]
Models Using Item Parcels as Indicators					
Invariance across waves					
1. Configural invariance	18.2	15	1.000	.999	.009 [.000, .022]
2. Weak invariance	19.9	19	1.000	1.000	.004 [.000, .018]
3. Strong invariance	41.5	23	.998	.996	.018 [.009, .027]
Invariance across cohorts ^a					
4. Configural invariance	171.0	140	.996	.994	.023 [.006, .034]
5. Weak invariance	194.5	150	.994	.991	.027 [.014, .037]
6. Strong invariance	207.3	160	.994	.991	.027 [.015, .036]
Models Using Items as Indicators					
Invariance across waves					
7. Configural invariance	692.8	336	.990	.987	.021 [.018, .023]
8. Weak invariance	667.8	354	.991	.989	.019 [.017, .021]
9. Strong invariance	929.3	452	.987	.987	.021 [.019, .022]

Note. Differences between models were tested with the test of small difference in fit

(MacCallum, Browne, & Cai, 2006). The results suggest that measurement invariance holds across waves and cohorts. For models using items as indicators, invariance could not be tested across cohorts. CFI = comparative fit index; TLI = Tucker-Lewis index; RMSEA = root-mean-square error of approximation; CI = confidence interval.

^a Models 4 to 6 are multi-group models, accounting for strong invariance across waves.

Table 3

Fit of Basic Growth Curve Models of Self-Esteem

Model	AIC	BIC
Intercept-only	25017.7	25175.0
Linear change	24983.6	25158.4
Quadratic change	24972.7	25170.9
Cubic change	24982.3	25209.6

Note. For AIC and BIC, lower values indicate better model fit. AIC = Akaike information criterion; BIC = Bayesian information criterion.

Table 4

Effects of Time-Invariant Covariates on Growth Factors of Self-Esteem

Covariate	Growth factors		
	Intercept	Linear slope	Quadratic slope
Cohort	0.06 (0.05)	−0.27 (0.34)	0.02 (0.52)
Gender ^a	−0.03 (0.05)	−0.19 (0.26)	−2.33 (1.35)
Education	0.05 (0.03)	−0.24 (0.13)	0.15 (0.86)
Residence ^b	0.03 (0.06)	−0.28 (0.28)	−0.26 (1.71)

Note. The table reports unstandardized regression coefficients, with standard errors in parentheses (all coefficients were nonsignificant; standardized coefficients are not available). For the analyses, the age variable was rescaled by the factor 10^{-2} to avoid numerically small estimates related to slope factors and to yield greater precision for these estimates. The original age scaling can be recovered by multiplying the regression coefficients of the linear slope by 10^{-2} , and the regression coefficients of the quadratic slope by 10^{-4} . The regression coefficients of the intercept were not affected by the rescaling of the age variable. Gender and residence were dummy-coded, and cohort and education were centered for the analyses.

^a 0 = male, 1 = female.

^b 0 = West Germany, 1 = East Germany.

Table 5

Effects of Time-Varying Covariates (TVCs) on Self-Esteem

TVC	<i>B</i>	<i>SE</i>
Relationship status ^a	0.03	0.07
Relationship satisfaction	0.19*	0.03
Employment status ^b	0.16*	0.06
Job satisfaction	0.11*	0.03
Individual income	0.02	0.03
Household income	0.08*	0.03
Health satisfaction	0.13*	0.03

Note. The TVC effects are unstandardized regression coefficients (standardized coefficients are not available). Dichotomous TVCs were dummy-coded and continuous TVCs were converted to *z* scores for the analyses.

^a 0 = not in a relationship, 1 = in a relationship.

^b 0 = unemployed, 1 = employed.

* $p < .05$.

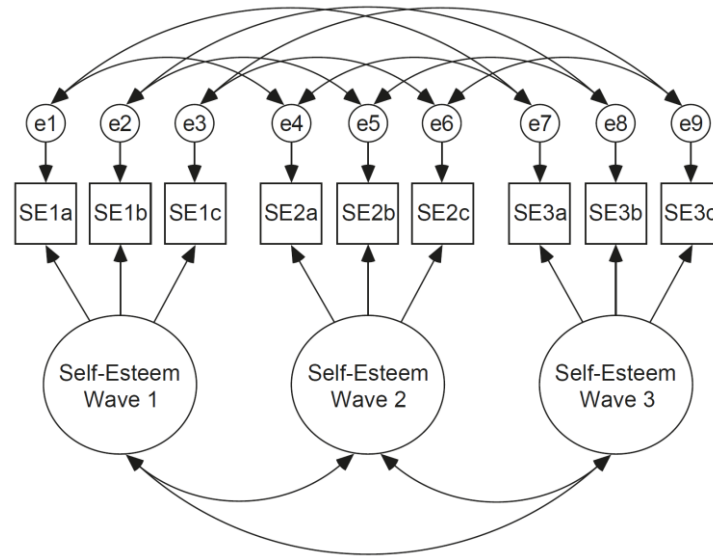


Figure 1. Measurement model of self-esteem. At each wave, self-esteem was measured by three item parcels (e.g., SE1a to SE1c at Wave 1). Error variances of parcels (denoted as *e1* to *e9*) were correlated across waves to control for bias due to parcel-specific variance (Cole & Maxwell, 2003).

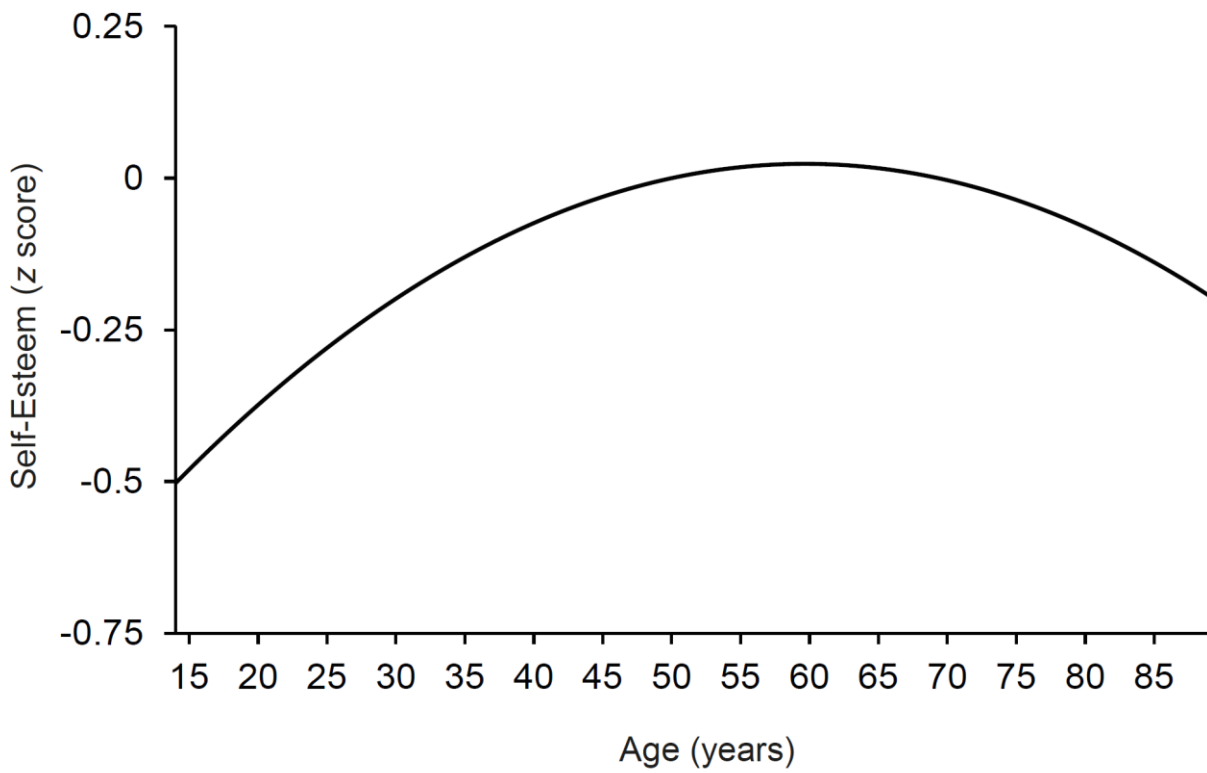


Figure 2. Average predicted trajectory of self-esteem from age 14 to 89 years.

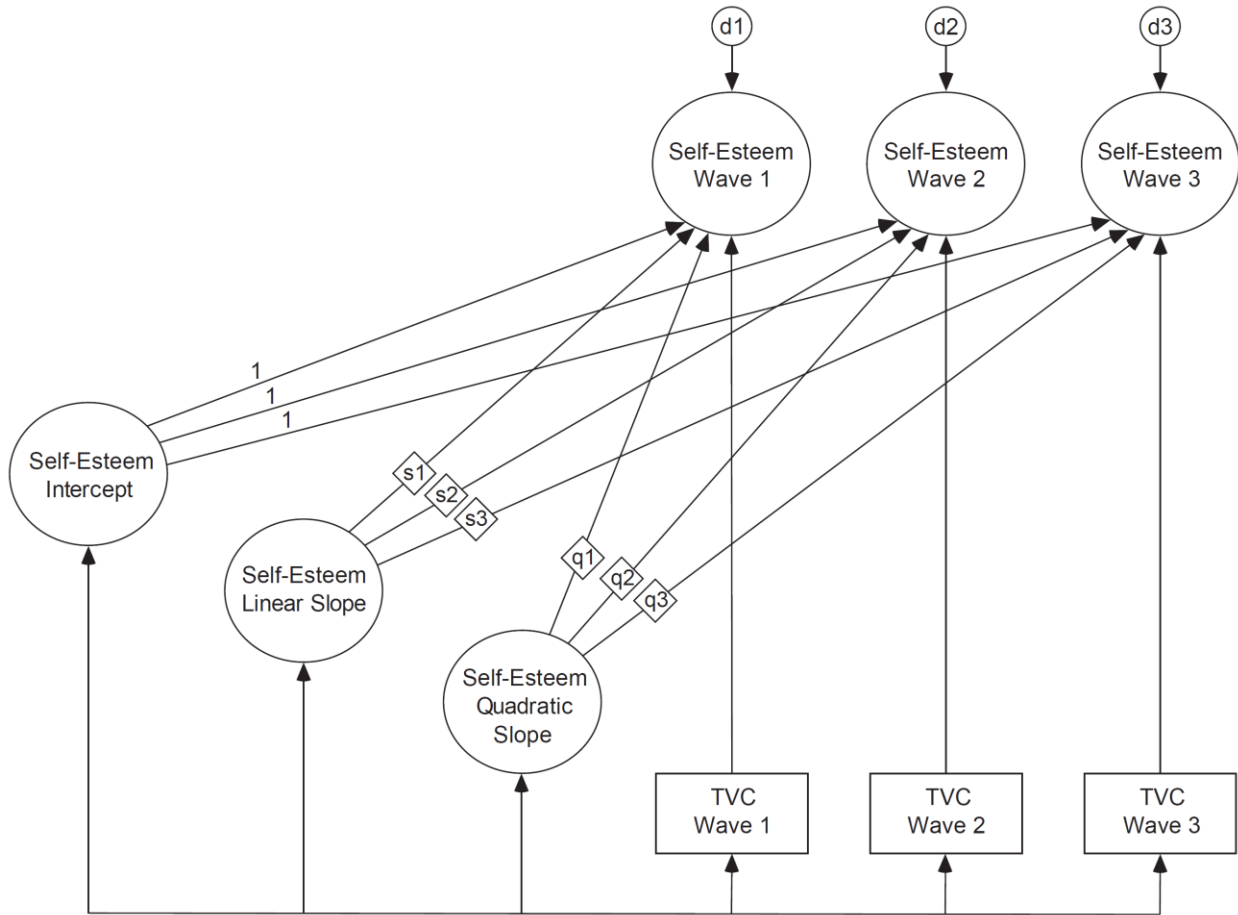


Figure 3. Growth curve model of self-esteem with a time-varying covariate (TVC). The model captures the development of self-esteem across the entire observed age range by using individual slope loadings. Parameters with individually-varying values are represented by diamonds (Mehta & West, 2000; Preacher et al., 2008). Linear slope loadings at Waves 1 to 3 are denoted as $s1$ to $s3$ and quadratic slope loadings are denoted as $q1$ to $q3$. Individual values for these loadings (i.e., age at assessments and the squared values, respectively; age was centered at 50 years) are included in the analysis through individual data vectors. The intercept loadings were set to 1 at each wave. The model includes covariances among intercept, linear slope, quadratic slope, and TVCs at Waves 1 to 3. The latent self-esteem factors at Waves 1 to 3 were measured as shown in Figure 1. Residual variances (i.e., disturbances) are denoted as $d1$ to $d3$.